APPEAL BRIEF
EXAMINING GROUP 2872
Patent Application
Docket No. GJE.7543

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner	:	Jade R. Chwasz
Art Unit	:	2872
Applicants	:	Jeffrey Blyth *et al.*
Serial No.	:	10/565,094
Filed	:	January 17, 2006
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For	:	Holographic Sensor

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APPEAL BRIEF

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November 29, 2010

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I. REAL PARTY IN INTEREST

The real parties in interest are Cambridge University Technical Services Ltd., located at The Old Schools, Trinity Lane, Cambridge, CB2 1TS, United Kingdom (as evidenced by the assignment set forth at Reel 018608/Frame 0191, recorded December 11, 2006), and Smart Holograms Ltd., located at 291 Cambridge Science Park, Milton Road, Cambridge, CB4 0WF, United Kingdom (as evidenced by the assignment set forth at Reel 018619/Frame 0178, recorded December 12, 2006).

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-19 were finally rejected in the Office Action of June 24, 2010 under 35 U.S.C. §103(a). The rejections of claims 1-19 are appealed herein.

IV. STATUS OF AMENDMENTS

There have been no amendments after the final Office Action of June 24, 2010.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The independent claims involved in this appeal are claims 1, 5, and 14.

Claim 1 is directed to an apparatus for detecting an analyte which comprises a sensor comprising a medium and, disposed therein, a hologram (page 2, lines 1-2; and page 5, lines 6-8). An optical characteristic of the hologram changes as a result of a variation of a physical property of the medium resulting from interaction with the analyte, and the hologram is formed as a non-planar mirror (page 2, lines 2-4; page 3, lines 13-14; and page 5, lines 8-11). The apparatus also comprises a unit of optical fibers for transmitting light to and from the hologram (page 6, lines 26-28). The non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism (page 3, lines 17-20; and original claims 2, 3, 10, and 12).

Claim 5 is directed to a method for the production of an apparatus comprising a unit of optical fibers and a sensor (page 2, lines 1-7; and page 6, lines 26-28). The sensor comprises a

medium and, disposed therein, a hologram, wherein an optical characteristic of the hologram changes as a result of a variation of a physical property of the medium resulting from interaction with the analyte, and wherein the hologram is formed as a non-planar mirror (page 2, lines 1-4; page 3, lines 13-14; and page 5, lines 6-11). The method comprises forming, in a medium, a hologram as a non-planar mirror, wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism (page 2, lines 5-7; page 3, lines 17-20; and original claims 2, 3, 10, and 12).

Claim 14 is directed to a method for the detection of an analyte, which comprises remotely interrogating, with light, the holographic element of a sensor (page 2, lines 8-10). The sensor comprises a medium and, disposed therein, a hologram, wherein an optical characteristic of the hologram changes as a result of a variation of a physical property of the medium resulting from interaction with the analyte, and wherein the hologram is formed as a non-planar mirror (page 2, lines 1-4; page 3, lines 13-14; and page 5, lines 6-11). The non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism (page 3, lines 17-20; and original claims 2, 3, 10, and 12). The interrogating is via a unit of optical fibers that transmits the light to and from the hologram (page 6, lines 26-28). The method further comprises detecting any change in an optical characteristic of the sensor (page 2, lines 10-11).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-6 and 14-19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Lowe *et al.* (U.S. Patent No. 5,989,923), Stephens *et al.* (GB Patent No. 2054995 A), and Yin *et al.* (U.S. patent No. 5,499,117). Claims 7-13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Lowe *et al.* in view of Stephens *et al.* and Yin *et al.*, as applied to claims 1 and 5, and further in view of Mizutani *et al.* (U.S. Patent no. 6,483,611).

VII. ARGUMENT

A. Claims 1-6 and 14-19 are patentable because the Examiner has not established a *prima facie* case of obviousness.

Claims 1-6 and 14-19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Lowe *et al.* (U.S. Patent No. 5,989,923), Stephens *et al.* (GB Patent No. 2054995 A), and Yin *et al.* (U.S. patent No. 5,499,117). Appealed claims 1-6 and 14-19 stand or fall together for purposes of the Appeal of this rejection under 35 U.S.C. §103(a).

Independent claim 1 is directed to an apparatus for detecting an analyte which comprises a sensor comprising a medium and, disposed therein, a hologram which is formed as a non-planar mirror, wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism. The apparatus also comprises a unit of optical fibers for transmitting light to and from the hologram

Independent claim 5 is directed to a method for the production of an apparatus comprising a unit of optical fibers and a sensor. The method comprises the step of forming, in a medium, a hologram as a non-planar mirror, wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism.

Independent claim 14 is directed to a method for the detection of an analyte, which comprises remotely interrogating, with light, the holographic element of a sensor. The sensor comprises a medium and, disposed therein, a hologram which is formed as a non-planar mirror, wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism. The interrogating is via a unit of optical fibers that transmits the light to and from the hologram

The Action of June 24, 2010 asserts in the paragraph bridging pages 5 and 6 that Lowe *et al.* disclose a hologram formed as a non-planar mirror, indicating that a "reflection hologram with fringes that can be flat or curved" meets this element of claims 1, 5, and 14. However, the Appellants assert that this interpretation of Lowe *et al.* is incorrect. As discussed in the signed Expert Declaration Under 37 C.F.R. §1.132 of Christopher Robin Lowe (submitted with the Amendment filed March 25, 2009 and entered into the record; hereinafter referred to as "the Lowe Declaration"), the Lowe *et al.* reference "does <u>not</u> disclose a hologram formed as a non-

planar mirror, or suggest that it should be" (emphasis added). Instead, "a non-planar mirror is a particular embodiment of particular utility in the context of the present invention." While Lowe *et al.* teach that the fringe planes may be flat or curved, "that is true of almost all holograms" (see paragraph 3 of the Lowe Declaration).

In fact, "the general disclosure of Lowe *et al.* is quite different from the creation of curved fringes as a result of using a reflector with a well defined geometry, which gives rise to controlled geometrical fringes." Such controlled fringes, as in the claimed invention, "are used to deliberately manipulate the incident light... in a way that conventional curved fringes," such as those in Lowe *et al.*, do not (see paragraph 3 of the Lowe Declaration). This deliberate manipulation is a necessary requirement for a sensor used in the apparatus and method of the present invention. Thus, contrary to the Action's assertion, Lowe *et al.* does not disclose a sensor with a hologram formed as a non-planar mirror, as required by the claimed invention. The Appellants note that Christopher Robin Lowe, in addition to being an inventor on the subject application and being aware of the level of ordinary skill in the art, is an inventor on the Lowe *et al.* reference.

Moreover, the Action of June 24, 2010 concedes at the top of page 6 that "Lowe *et al.* do not disclose a unit of optical fibers for transmitting light to and from the hologram...." The Action then asserts that Stephens *et al.* teach a unit of optical fibers for transmitting light to and from a hologram and that "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Lowe *et al.*, as taught by Stephens *et al.*, in order to guide light with the narrowest possible bandwidth to the holographic surface so that the colors reflected are indicative of the part of the reflector from which it is received." However, this assertion misinterprets the teachings of Stephens *et al.* (see, e.g., paragraph 4 of the Lowe Declaration).

Stephens *et al.* actually disclose a source of broadband light which illuminates the hologram. The holograms reflect light of the narrowest possible bandwidth **from** the holographic surface (see, e.g., column 1, line 43 through column 2, line 93 of Stephens *et al.*). The Appellants find no teaching or suggestion in Stephens *et al.* of guiding narrow band light **to** the holographic surface and submit that there is no such teaching or suggestion. The reason given in the Action for modifying the Lowe *et al.* reference with Stephens *et al.* is not valid because the teachings of Stephens *et al.* have been misinterpreted. In addition, even assuming

for the sake of argument that Stephens *et al.* teach guiding narrow band light to the surface as the Action alleges (though the Appellants maintain that there is no such teaching), a skilled artisan would readily recognize that, if "light with the narrowest possible bandwidth" was guided to the surface of a holographic sensor, in most cases there would be no reflection (see paragraph 5 of the Lowe Declaration). The reason given in the Action would thus still be invalid because one of ordinary skill in the art would not consider a reference that teaches directing narrow band light to the surface relevant to use with a holographic sensor of the type described by Lowe *et al.* A skilled artisan would certainly not consider the disclosure of Stephens *et al.*, which actually teaches reflecting light of the narrowest possible bandwidth from the surface, relevant to use with a holographic sensor of the type described by Lowe *et al.*

The Appellants assert that one of ordinary skill in the art would not have had a reason to modify Lowe *et al.* with Stephens *et al.* without the benefit of hindsight. Hindsight reconstruction of the prior art cannot support a §103 rejection, as was specifically recognized by the CCPA in *In re Sponnoble*, 56CCPA 823, 160 USPQ 237, 243 (1969). The Appellants recognize the Action's statement at page 3 that "any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning[,] [b]ut so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper" (citing *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209, CCPA 1971). However, the Appellants maintain that a skilled artisan simply would not have considered Stephens *et al.* and Lowe *et al.* together without the hindsight gleaned from the Appellants' own disclosure. Without such hindsight, the disclosure of Stephens *et al.*, which teaches reflecting light of the narrowest possible bandwidth from the surface, would not have been considered relevant to use with a holographic sensor of the type described by Lowe *et al.*

To further emphasize this point, the Appellants note that Stephens *et al.* disclose the use of concave reflectors comprising variations in refractive index through the thickness (holographic reflectors), which via constructive interference reflect light of a predetermined wavelength in a given direction. The wavelength is different for each of the reflectors. The predetermination of the wavelength and the requirement to reflect only a very narrow spectral range are prerequisites for the proper functioning of the optical encoder in Stephens *et al.* Also, Stephens *et al.* teach a rigidly fixed optical arrangement of the fiber source/detector assembly

and the holographic elements, and the Stephens *et al.* system is expected to be used without interposing material between the fiber sensor/detector assembly and the holographic element. Stephens *et al.* include a set of individually defined holographic reflectors, each prepared to reflect a single predetermined wavelength, and the holographic reflectors of Stephens *et al.* are designed individually to reflect light of the narrowest possible bandwidth from the holographic surface. A skilled artisan simply would not have considered the disclosure of Stephens *et al.*, including all of these specifications, to be relevant to use with a holographic sensor of the type described by Lowe *et al.*

The mere fact that the purported prior art could have been modified or applied in some manner to yield an applicant's invention does not make the modification or application obvious unless "there was an apparent reason to combine the known elements in the fashion claimed" by the applicant. *KSR International Co. v. Teleflex Inc.*, 550 U.S. 550 U.S. 398, 127 S. Ct. 1727, 82 U.S.P.Q.2d 1385 (2007). Also, an applicant's invention is not "proved obvious merely by demonstrating that each of its elements was, independently, known in the (purported) prior art." *Id.* In this case, one of ordinary skill would not have had any reason to consider Stephens *et al.* in combination with Lowe *et al.*, let alone to modify Lowe *et al.* with its teachings. Though the Action has asserted a reason for combining Lowe *et al.* and Stephens *et al.* ("...to guide light with the narrowest possible bandwidth to the holographic surface..."), it is not valid as discussed above. Instead, such a reason could only be found with the benefit of hindsight.

Furthermore, the Action of June 24, 2010 concedes in the first full paragraph of page 6 that the combination of Lowe *et al.* and Stephens *et al.* does not disclose a hologram which is formed as a non-planar mirror, "wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism." The Action then asserts that Yin *et al.* teach a non-planar surface that is convex and/or concave and that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the hologram substrate of the modified Lowe *et al.* reference to have curvature, as taught by Yin *et al.* in order to have a reflection hologram formed on a curved surface without distorting the optical properties of the hologram layer to increase the number of applications possible for the holographic element.

However, contrary to the Examiner's assertions, Yin *et al.* do not teach a non-planar surface as in the claimed invention. Yin *et al.* disclose a means of recording a hologram on a

non-planar surface and a method of transferring the hologram to another identical surface. The purpose of Yin *et al.* is to overcome potential difficulties with having to place a recorded holographic film on a surface of an object which cannot be used as a recording substrate, for example because it is flexible (see, e.g., Background section of Yin *et al.*).

In Yin *et al.*, the recording material is cast onto a rigid substrate having the same non-planar properties as the final substrate, together with other layers to facilitate subsequent release of the recording layer, and then the hologram is recorded. As a skilled artisan would understand, it stands as a fundamental fact that, when illuminated, the fringes formed in the non-planar holographic layer will reconstruct an image of the object recorded. Yin *et al.* disclose that the hologram is recorded in the conventional way, and so can be of any object. The exposure surface is transparent (see column 2, line 15 of Yin *et al.*). One of ordinary skill in the art, bearing in mind the application for providing head-up displays and the like, would understand that the hologram would be recorded in transmission mode, where laser light scattered from an object external to the assembly shown in Figures 1-4 of Yin *et al.* interferes with a reference beam propagating though the substrate to form fringes in the recording layer. A complex image gives rise to complex fringes, but in all cases the shape of the fringes does not depend on the shape of the recording layer. When the layer is transferred to the final surface, the non-planar characteristics of the fringes are preserved, and thus the image is reconstructed accurately.

Only if the exposure surface of Yin *et al.* was reflective, thereby forming the object (of which there is no disclosure or suggestion), would the hologram be recorded in reflection mode and give rise to fringes which would reconstruct a convex or concave mirror. However, there is neither any disclosure of this nor any application of it. Instead, the reflective surface is the object, so if the exposure surface of Yin *et al.* were to be reflective, the hologram would not reconstruct the head-up display information which is the purpose of Yin *et al.* Thus, not only is there no teaching or suggestion in Yin *et al.* of the exposure surface being reflective (such that the hologram is recorded in reflection mode and gives rise to fringes which would reconstruct a convex or concave mirror), but modifying Yin *et al.* to include such a feature would defeat the purpose of the reference because the head-up display information would then not be reconstructed. A proposed modification cannot render (purported) prior art unsatisfactory for its intended purpose. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Also, if a proposed modification of the (purported) prior art would change the principle of operation of the

(purported) prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

Yin *et al.* disclose only that any image can be reconstructed in a non-planar film, and says nothing about the retro-reflecting properties of a hologram recorded using a concave or convex mirror (or a prism or a mirror recorded using one or more reflective beads). A skilled person would therefore have no reason to look to the Yin *et al.* reference because modifying the hologram substrate of Lowe *et al.* with the curvature of Yin *et al.* would merely lead to a sensor comprising a holographic recording of any object in a curved layer which would not have the retro-reflecting properties necessary for the present invention. That is, modifying the hologram substrate of the modified Lowe *et al.* reference with the curvature of Yin *et al.* would not give a hologram which is formed as a non-planar mirror, wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism.

When determining whether a claim is obvious, an examiner must make "a searching comparison of the claimed invention – *including all its limitations* – with the teaching of the prior art." *In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) (emphasis added). Thus, "obviousness requires a suggestion of all limitations in a claim." *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (*citing In re Royka*, 490 F.2d 981, 985 (CCPA 1974)). In this instance, neither the limitation that "the hologram is formed as a non-planar mirror," nor the limitation that "the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism," is taught or suggested in the combination of cited references. Nor is there any reason why a skilled artisan would have modified the references to arrive at the claimed invention.

As discussed above, the mere fact that the purported prior art could have been modified or applied in some manner to yield an applicant's invention does not make the modification or application obvious unless "there was an apparent reason to combine the known elements in the fashion claimed" by the applicant. *KSR, supra.* Also, an applicant's invention is not "proved obvious merely by demonstrating that each of its elements was, independently, known in the (purported) prior art." *Id.* In this case, one of ordinary skill would not have had any reason to turn to Stephens *et al.* or Yin *et al.*, let alone to modify Lowe *et al.* with their teachings. Instead,

such a reason could only be found with the benefit of hindsight. Hindsight reconstruction of the prior art cannot support a §103 rejection, as was specifically recognized by the CCPA in *In re Sponnoble*, *supra*.

As discussed above, the combination of cited references does not teach or suggest a hologram formed as a non-planar mirror, wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism. Additionally, a skilled artisan would not have considered the disclosure of Stephens *et al.* relevant to use with a holographic sensor of the type described by Lowe *et al.*, and therefore would not have found a reason to modify the Lowe *et al.* device or method with the unit of optical fibers of Stephens *et al.* (see, e.g., paragraphs 4 and 5 of the Lowe Declaration).

Accordingly, the Examiner has not established a *prima facie* case of obviousness for claims 1-6 and 14-19.

B. Claims 7-13 are patentable because the Examiner has not established a *prima facie* case of obviousness.

Claims 7-13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Lowe *et al.* (U.S. Patent No. 5,989,923), Stephens *et al.* (GB Patent No. 2054995 A), and Yin *et al.* (U.S. patent No. 5,499,117), as applied to claims 1 and 5, and further in view of Mizutani *et al.* (U.S. Patent No. 6,483,611). Appealed claims 7-13 stand or fall together for purposes of the Appeal of this rejection under 35 U.S.C. §103(a).

As discussed above in subsection A, the combination of Lowe *et al.*, Stephens *et al.*, and Yin *et al.* does not teach or suggest a hologram formed as a non-planar mirror, wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism. Additionally, a skilled artisan would not have considered the disclosure of Stephens *et al.* relevant to use with a holographic sensor of the type described by Lowe *et al.*, and therefore would not have found a reason to modify the Lowe *et al.* device or method with the unit of optical fibers of Stephens *et al.* Mizutani *et al.* do not cure these deficiencies. That is, the combination of cited references fails to teach or suggest a hologram formed as a non-planar mirror, wherein the non-planar mirror is concave, convex, capable of

effecting retroreflection, recorded using one or more reflective beads, or a prism. The combination of cited references also fails to provide a valid reason why a skilled artisan would have modified the Lowe *et al.* reference to include a unit of optical fibers for transmitting light to and from the hologram.

Accordingly, the Examiner has not established a *prima facie* case of obviousness for claims 7-13.

D. Conclusion

In view of the foregoing, the Appellants urge the Board to reverse the outstanding rejections under 35 U.S.C. §103(a) and pass this application to issuance.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. An apparatus for detecting an analyte, comprising:

a sensor comprising a medium and, disposed therein, a hologram, wherein an optical characteristic of the hologram changes as a result of a variation of a physical property of the medium resulting from interaction with the analyte, and wherein the hologram is formed as a non-planar mirror; and

a unit of optical fibers for transmitting light to and from the hologram;

wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism.

2. The apparatus according to claim 1, wherein the hologram is formed as a concave mirror.

3. The apparatus according to claim 1, wherein the hologram is formed as a convex mirror.

4. The apparatus according to claim 1, wherein the hologram is formed as a corner cube prism.

5. A method for the production of an apparatus comprising a unit of optical fibers and a sensor comprising a medium and, disposed therein, a hologram, wherein an optical characteristic of the hologram changes as a result of a variation of a physical property of the medium resulting from interaction with the analyte, and wherein the hologram is formed as a non-planar mirror; wherein said method comprises forming, in a medium, a hologram as a non-planar mirror; wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism.

6. The method according to claim 5, wherein the hologram is recorded in a non-planar medium.

7. The method according to claim 6, wherein the hologram is recorded using a planar mirror.

8. The method according to claim 5, wherein the hologram is recorded using a non-planar mirror.

9. The method according to claim 8, wherein the hologram is recorded using a concave mirror.

10. The method according to claim 8, wherein the hologram is recorded using a mirror capable of effecting retroreflection.

11. The method according to claim 10, wherein the hologram is recorded using a corner cube prism.

12. The method according to claim 8, wherein the hologram is recorded using one or more reflective beads.

13. The method according to claim 5, wherein the hologram is recorded using a lens, aperture, slit or obstacle, or a combination thereof, placed between the light source and the medium.

14. A method for the detection of an analyte, which comprises remotely interrogating, with light, the holographic element of a sensor comprising a medium and, disposed therein, a hologram, wherein an optical characteristic of the hologram changes as a result of a variation of a physical property of the medium resulting from interaction with the analyte, and wherein the hologram is formed as a non-planar mirror; wherein the non-planar mirror is concave, convex, capable of effecting retroreflection, recorded using one or more reflective beads, or a prism; wherein the interrogating is via a unit of optical fibers that transmits the light to and from the hologram; and wherein said method further comprises detecting any change in an optical characteristic of the sensor.

15. The method according to claim 14, wherein the light is collimated.

16. The method according to claim 14, wherein a recording surface of the non-planar mirror is formed as a non-planar surface.

17. The method according to claim 15, wherein a recording surface of the non-planar mirror is formed as a non-planar surface.

18. The method according to claim 5, wherein a recording surface of the non-planar mirror is formed as a non-planar surface.

19. The apparatus according to claim 1, wherein a recording surface of the non-planar mirror is formed as a non-planar surface.

IX. EVIDENCE APPENDIX

Following is the Declaration Under 37 C.F.R. §1.132 of Christopher Robin Lowe, executed March 16, 2009 (two pages). The Declaration was submitted with the Amendment filed March 25, 2009. The Declaration was fully considered and entered into the record by the examiner, as indicated in paragraph 1 of the Office Action dated May 1, 2009.

X. RELATED PROCEEDINGS APPENDIX

None.

Patent Application
Docket No. GJE-7543
Serial No. 10/565094

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	:	Jeffrey Blyth *et al.*
Serial No.	:	10/565094
Filed	:	January 17, 2007
Art Unit	:	2872
For	:	HOLOGRAPHIC SENSOR

Commissioner for Patents
P O Box 1450
Alexandria, VA 22313-1450

DECLARATION OF CHRISTOPHER ROBIN LOWE

Sir:

I, Christopher Robin Lowe, of the Institute of Biotechnology, University of Cambridge, Tennis Court Road, Cambridge, CB2 1QT, United Kingdom, make this declaration based on my personal knowledge and belief:

1. I am one of the inventors of the subject Application.

2. I have reviewed the specification and claims, the Office Action dated November 25, 2008, and the references cited in it, including those identified as Lowe *et al* (US5989923) and Stephens *et al* (GB2054995A).

3. The Examiner states that Lowe *et al* discloses apparatus "wherein the hologram is formed as a non-planar mirror (reflection hologram with fringes that can be flat or curved)". That is incorrect. It discloses that the fringe planes may be flat or curved, but that is true of almost all holograms. For example, a hologram of a 3-dimensional object is not flat; the fringes are curved. Accordingly, Lowe *et al* does not disclose a hologram formed as a non-planar mirror, or suggest that it should be; a non-planar mirror is a particular embodiment of particular utility in the context of the present invention. The general disclosure of Lowe *et* al is quite different from the creation of curved fringes as a result of using a reflector with a well defined geometry, which gives rise to controlled geometrical fringes. Specifically, these controlled fringes are used to deliberately manipulate the incident light, such as focus, or control the direction of, the reflected light, in a way that conventional curved fringes from a

three-dimensional object do not. This manipulation is advantageous for a sensor used in the subject Application.

4. The Examiner alleges that it "would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Lowe *et al.*, as taught by Stephens *et al.*, in order to guide light with the narrowest possible band width to the holographic surface so that the colours reflected are indicative of the part of the reflector from which it is received". I believe that this statement misinterprets the disclosure of Stephens *et al.*, in particular.

5. In the event that "light with the narrowest possible band width" was guided to the surface of a holographic sensor, in most cases there would be no reflection. This would be evident to one of ordinary skill in the art, and that person would therefore not consider the disclosure of Stephens *et al.* as relevant to use with a holographic sensor of the type described by Lowe *et al.*

6. It is evident from the specification of the subject Application that, rather than using monochromatic light (as disclosed by Stephens *et al.*), the optical fibres guide white light to the surface, capture the reflected narrower band light, and guide that to the detector. This key feature is not taught by neither Lowe *et al.* nor Stephens *et al.* Further, neither Lowe *et al.* nor Stephens *et al.* suggests the special utility of the present invention, i.e. the ability to use a subcutaneous implant, in diagnosis.

I hereby further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

By: C R Lowe Date: 16.03.09

PROF. C.R. LOWE